This Bulletin is an official publication of the extension service of the Bureau of Sugar Experiment Stations, issued and forwarded by the Bureau to all cane growers in Queensland.

The Cane Growers' Quarterly Bulletin

VOL. XVII. 1 JANUARY, 1954 No. 3

David Lindsay McBryde

We record, with deep regret, the sudden death of David Lindsay McBryde on November 14th, 1953.

Mr. McBryde had served for 19 years on the Bureau staff and was perhaps best known in the industry for the valuable work on sugar boiling control methods which he carried out in the early thirties. When, in 1935, the Mackay Sugar Experiment Station was moved to its present site, advantage was taken of his earlier agricultural experience to appoint him as Chemist in Charge. He retained that position until 1946, when he was transferred to Head Office, and became responsible for operating the Mutual Control Scheme for Queensland mills. It was during Mr. McBryde's period of service at Mackay that the two varieties Q.28 and Q.50 were grown as seedlings and selected on that Station. There could be no more fitting monument to his work than the cane variety Q.50, which this year will probably be the major one in the State.

The Bureau staff extend their sincere sympathy to his son and daughter.

Hot Water Treatment of Cane Plants in the Mulgrave Area

During the past planting season more than 5,000 bags of cane plants were hot-water treated by the Mulgrave Cane Pest and Disease Control Board, while over a hundred different varieties were hot-water treated prior to planting on the Meringa Experiment Station. Work this season confirms last year's experience that there is a very definite varietal reaction to hot-water treatment, some varieties being tolerant to heat, while others are easily damaged. Trojan and S.J.4 come in this latter category, and many poor germinations were obtained, while Pindar and Cato generally stood the heat treatment well.

At the Mulgrave tank all cane is treated in bags, up to 30 in each batch, and it was found that when stacked in a heap these bags kept hot for many hours. There is evidence to support the contention that this was a contributing factor to poor germination, so that it is now the practice to hose each batch with cold water after being removed from the tank. Some growers have tried keeping the plants some 36 hours before planting and during this period keeping them moist by occasional hosing. Many report excellent results.

Undoubtedly, the deciding factor in germination is one of temperature.

Fig. 32—Young stools growing in 22-gallon containers. The three on the left are grown from plants affected with ratoon stunting disease. The three on the right are from plants cured of disease by hot-water treatment. Note the great difference in early vigour and stooling.

Various ideas have been tried out to see if better germination could be obtained. It was suggested that perhaps stripping cane some time prior to treatment may help, and accordingly a small germination trial was set out on this Station. Heat treatment for two hours at 50 degrees C. was carried out on twelve months old plant Trojan which had been stripped for one, two, three and four weeks respectively. Planting commenced on July 27th and plantings were made each week for four weeks. Results in this instance showed that stripping cane is of no help in obtaining better germination after heat treatment. If anything, the evidence seemed to point the other way. Other instances have been recorded where local growers have had cane stripped for upwards of six weeks previous to treatment and then had a failure in germination.

During the winter plantings, a sudden drop in temperature plays havoc with the strike of hot-water treated plants. Where conditions are ideal for germination, reasonable to good strikes will be obtained, but any factor working against germination will be accentuated with hot-water treated plants. The experience of the past two years suggests the following rules which will help to obtain better germinations in North Queensland:

(1) Handle plants with care, particularly after treatment when eyes are soft.

(2) Plant under ideal conditions as to moisture, temperature, cover, etc.

(3) Do not plant in cold weather.

(4) If early in the season and using immature cane, discard the top plant.

(5) If late in the season discard the bottom portion.

(6) Do not allow plants to sweat by stacking bags when hot, and do not allow plants to dry out before planting.

(7) In view of the fact that after heat treatment the eyes are soft, consolidation after planting has not been recommended for fear of damage to these eyes, but in several plantings where the drills have been consolidated after planting, germination has been excellent, and in one instance where only two drills were done, these were outstandingly better than the balance of the planting.

Plantings made on the Station during the season clearly indicated the value of using clean plants. One block containing over 100 different parent canes and other varieties was planted with material obtained from hot-water treated stocks (*i.e.*, cane which was treated last year). In all cases the germination has been phenomenal and early growth of cane rapid. Several small lots of hot-water treated cane have been distributed from this Station during the year, and in almost all cases germination and early growth have been superior to that from plants used by the grower.—G.B.

Velvet Beans on the Burdekin

By E. V. HUMPHRY

The velvet bean is an outstanding green manure crop and is becoming increasingly popular on the Burdekin. Some excellent crops were grown in the summer of 1952-53, the best of which were estimated to have yielded approximately 15-20 tons per acre of green material. They presented some problems at the time of ploughing in, but all growers overcame their difficulties satisfactorily. When it is remembered that crops of this size supply to the soil nitrogen equivalent to over 1,000 lb. of sulphate of ammonia per acre, the trouble and expense involved in obtaining seed, planting, irrigating and ploughing in is considered well worth while.

A few growers planted Poona pea in 1952-53, but crops were a failure, due to a phytopthora species of fungus which causes wilting. Fortunately velvet beans are resistant to this wilt and able to withstand heavy downpours of rain, as witnessed this year when thirty inches were recorded on twenty-one wet days in January. A few patches only were killed, these being in hollows where water was lying for a considerable time. Poona pea crops failed to come through the wet season; few produced a good cover crop, and most were a complete failure. Velvet beans are also quite drought resistant and, as the spring and early summer period on the Burdekin is usually dry, they have a special value. Germination is not a big problem in this area, as all growers are able to irrigate and thus obtain sufficient moisture to ensure a good strike.

Methods of Planting.

Broadcasting.—This method of planting is the easiest and quickest, but is not generally recommended for this area unless soil moisture is excellent and there are prospects of more rain. Admittedly velvet beans are drought resistant, but the top three or four inches of soil dries out very rapidly on some irrigated soils, and if this happens before the young plants become established, deeper rooted weeds and grasses will take over and crowd them out. Nevertheless, some satisfactory cover crops have been grown by this method. Some growers have even gone to the trouble of rough furrowing their land, watering, and then ploughing, after which the seed is disced under. An

advantage of this method is that the block is not left furrowed and the crop is easier to plough in.

Planting with the Cotton or Maize Planter.—Crops have been sown with a maize planter and this method appeared to be quite satisfactory when the soil moisture was good. One advantage is that the seed is planted in moist soil, the dry top soil remaining on the surface. With discing, of course, much of the moist soil is turned up and dry soil buried with the seed. Another advantage is that the block is not deep furrowed and so ploughing in is made easier. The disadvantage is that the block cannot be irrigated unless it is furrowed.

If conditions are dry the block can be rough furrowed, irrigated, ploughed or disced and the seed then planted through the planter. A modification to be made to the planter is the provision of thicker feed plates with the holes through which the seeds drop of sufficient diameter to take the largest of them.

Planting with the Cane Planter.—The most popular method of planting appears to be that making use of the ordinary cane planter. The operator sits in the planter box with a tin of seed and drops them singly down the chute so that they are spaced roughly from one and a half to two feet apart. If good moisture is available the drill can be fairly shallow, but if conditions are fairly dry the drill must be made deeper and the seed dropped down to a good depth to get enough moisture for germination. Soil cover should be about two inches.

If conditions are very dry a drill suitable for irrigation is first made. The seed is then dropped down the chute but little or no cover applied. The block is then irrigated and it is found that the movement of the irrigation water applies enough soil cover to ensure a satisfactory germination. The advantage of this method is that if dry weather continues, the crop can be given a second and even a third watering, ensuring prolific growth and cover.

If weed growth appears likely to cause trouble the block can be cultivated and at the same time the edges of the furrows levelled down to make an

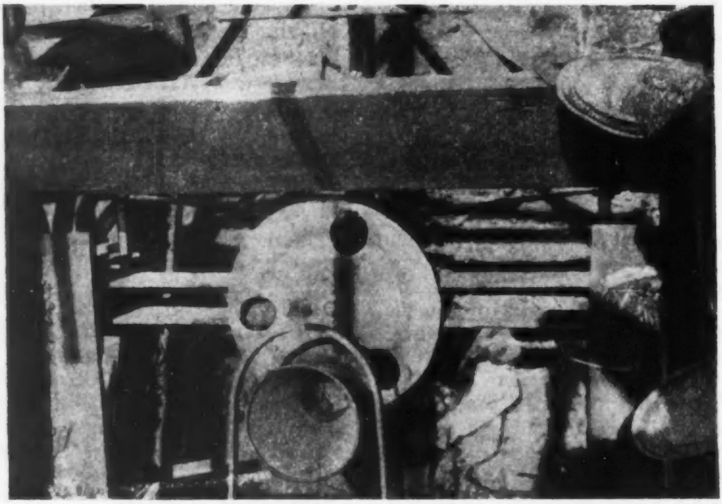

Fig. 33—View of spacing plate described in article—looking down on to the cutter planter. The manner in which the plate is secured to the knife drive shaft can be seen.

Fig. 34—A young crop of velvet beans planted through a cane planter.

Fig. 35—A good crop of velvet beans—not yet mature—on a Burdekin farm.

easier job of the ploughing in. If planting is carried out during August-September there is seldom enough weed growth to cause crowding out, but if planting is left until the hotter months of November-December weed growth is likely to be prolific. Drills are usually four feet six inches apart and, in one planting on the Experiment Station, spacing was five feet, and resulted in an excellent cover.

Rate of Seeding per Acre.

About 20 lb. of seed per acre is required if broadcast, but if sown in drills 12 to 15 lb. per acre will suffice. However, it was noted by the writer that some plantings made this year were at the low rate of 10 lb. per acre.

A novel idea which gives exact spacing of seed in the drill has been devised for attachment to the cutter planter by Mr. W. Frisby of Maidavale. A circular plate was made from heavy gauge flat galvanized iron, the circumference being that of the circle traced out by the outside edge of the knives when in motion.

The knives were taken off the cutter planter and the plate bolted dead centre to the knife drive shaft. The plate had three holes evenly spaced around its outside edge; the holes were the same size as the base of the funnel through which the stalks of cane are normally fed.

As the planter moves forward and the plate revolves the holes pass under the funnel's opening. The operator drops seed singly down the funnel on to the plate and when the hole in the plate passes the funnel the seed drops through and down the chute to the furrow. With three holes in the plate the seed is spaced in the drills at approximately twenty-two inch intervals.

A Method to Simplify Two-row Cultivation

On many cane farms throughout the State, tractors and equipment for two row cultivation of young cane are available, but these can be used to the best advantage only where two row planting has been adopted. Many farms may be too small to warrant the use of a two row planter, or labour difficulties may restrict the use of such a unit, and in some northern districts weather conditions may make necessary a special method of planting. Following single row planting, slight variations in the inter-row width can result in considerable damage to the young crop when two row cultivation is used subsequently.

The fact that a planter always seems to follow the line of a previous grubber tyne has been made use of on the Lower Burdekin Sugar Experiment Station, where the fields are marked out with a tractor drawn grubber, from which all except two tynes have been removed, these tynes being set at the normal inter-row distance. This operation can be carried out some time prior to planting and the lines remain effective for a considerable period, except when heavy rain falls before planting. Tynes are set at a depth which will break the hard subsoil below plough depth and the loss of moisture is negligible, since the soil is not turned or exposed to sun and air. A shallow surface mark may be made by clamping a small suitably shaped metal furrower at the correct height on the grubber tynes, or by wrapping a bag round the upper half of each tyne. Excellent cane germinations have followed this method of planting preparation and this may to some extent be due to better tilth of the soil in the planting furrow; the partial breaking of the subsoil below the plants may improve subsequent growth.—G.A.C.

2,4-D Damage to Sugar Cane

Hormone weedicides are an efficient means of pre-emergence control of weeds and grasses without damage to cane crops. However, it is a recognised fact that when land is sprayed after the crop has started to make cane these sprays may affect the cane stalks and cause malformations of various kinds.

The damage depicted occurred in an August plant crops of S.J.4 sprayed at the age of five months. The crop was out of hand and showing 18 inches to two feet of cane at this time. Four pounds of 2, 4-D in approximately 100 gallons of water per acre was applied by knapsack spray as a contact and pre-emergence measure. The soil type is a heavy clay loam at Highleigh, in the Mulgrave area.

Although damage occurred in this instance, experimentation and experience has proved that pre-emergence sprays can be applied to newly planted, ungerminated cane or young plant or ratoon cane without adversely affecting the crop.—E.A.P.

Fig. 36—Malformation of a stalk of S.J.4. as the result of spraying with 2,4-D.

The Bureau is Growing

During the past six months members of the Sugar Experiment Stations Board, during inspections of the four Sugar Experiment Stations, have given consideration to extending the overcrowded premises at Meringa and Bundaberg. Architects have been consulted in each case to advise on the extensions. The Bundaberg office-laboratory building was constructed in 1926, when the total staff was a Chemist in Charge and an Entomologist; to-day there are eight staff officers. The present office building at Meringa was, prior to 1934, a residence; at the present time it houses a staff of eleven, and this number will increase in the future with the rising demand for services to the industry.

In Brisbane also the Bureau is feeling the effects of restricted floor space in its section of the Department of Agriculture building. It will, in the near future, have to seek other quarters where more extensive offices and laboratories will provide for present and future needs.—N.J.K.

Some Glimpses of Overseas Sugar Countries*

By NORMAN J. KING

During my absence from Australia in April, May and June of this year I was fortunate enough to visit such sugar producing countries as Hawaii, Jamaica, Barbados, Trinidad, Colombia, Florida and South Africa. The prime object of the tour was to attend a Congress of the International Society of Sugar Cane Technologists in the British West Indies during April and the investigations in other lands were supplementary and incidental to the Congress proceedings.

Australia was well represented at the gathering, which occupied three weeks; two of them were spent on excursions through plantations and mills and the third with the presentation and discussion of papers on a wide range of technical sugar subjects. Five delegates went from the Queensland industry, and the Colonial Sugar Refining Co. sent a similar number from its Australian and Fiji staff. In all some 280 delegates were in attendance, representing 23 different sugar producing countries.

The prime value of such meetings lies in the interchange of experiences, methods and ideas, and the assimilation of research results achieved by workers in other lands. But considerable value accrues from observation of non-technical matters, including labour conditions, marketing problems, living standards, and so on, any of which can have a direct bearing on the technical methods employed. For instance, a certain agricultural procedure in some of the British West Indies, although of technical interest and value, could not be applied in Queensland unless a major social and economic change took place here first. Labour is cheap and plentiful in those islands—even though less efficient than ours—and it does make practicable some methods which would be uneconomic in this State.

A visitor to overseas sugar countries must also keep in mind, when contrasting our sugar industry with others, that whereas they work mainly on the large plantation system we have developed along the lines of relatively small farms. A system of agriculture applicable to one does not necessarily fit into the other, and cognisance must be taken of this difference.

The British West Indies produce about 900,000 tons of sugar which makes their industry comparable in size with the Queensland one, but whereas we consume about half our production, they use locally only about 15 per cent. of their total, the remainder going on to the Empire market. One major difference which cannot but be noticed by a visitor to their plantations is that practically every factory has its own distillery producing in the aggregate some seven and a half million gallons of rum, most of which is exported. The yield of sugar per acre over the past three years was three tons—slightly below the Queensland figure.

The visit to Colombia in South America broke new ground since no Australian sugar representative had previously seen that sugar industry. Perhaps in the future we will hear more of it. The relatively small industry is situated in the Cauca Valley, only three degrees north of the equator and at an elevation of 3,300 feet. The valley, an ancient lake bed, is extensive and extremely fertile. Its alluvial soils are deep and flat, and it is claimed that over a million acres of first class arable land could be devoted to sugar cane; if this be accepted, the sugar producing potential of the valley would place it among the largest sugar producers in the world. The round-the-year temperature is equable, rainfall is about

* An A.B.C. Broadcast.

40 inches, but ample irrigation water is available. The extraordinary fertility of the soils is evidenced by the fact that after 80 years of cane growing the land still does not require any fertilizer, even though large crops are harvested. Labour is plentiful, agricultural practices modern and some factories are quite up-to-date. Other very primitive mills produce only a local consumption sugar product called panella, which is something like fudge and is preferred by the native populace. Colombia has a fine agricultural experiment station at Palmira, where some cane breeding is conducted, but to date its work has had no influence on the sugar industry, which is dependent mainly on Javan cane varieties. An unusual feature of the landscape, particularly to a Queenslander, was to be so close to the equator but to be able to see ice capped peaks in the high mountain range forming the western boundary of the valley.

The proximity of these ice and snow-clad mountains is important to agriculture in the Cauca Valley, since it is from them that the surface and underground water supplies, so essential in irrigation, are replenished each year. Not least of the difficulties associated with travel and the collection of information in this country was that of language: Several days of speaking through an intermediary was something of a strain both for the visitors and the interpreter.

Much of the land not producing sugar in the valley is devoted to grazing and small crops. No doubt this is the salad bowl of Colombia, as well as contributing largely to milk and beef production. Vast blocks of beans which require no spraying because of the non-existence of bean-fly would be the envy of our vegetable growers.

In Florida the cane growing conditions varied again. Here the United States Sugar Corporation operates a large mill and extensive plantations on the saw-grass peat soils which formed part of the Everglades and which fringe on to Lake Okeechobee. Peat soils averaging five feet in depth but sometimes attaining ten feet contain a very high proportion of organic matter, but are deficient in mineral plant foods. They are flat and easily cultivable, but present their own problems. For instance, it was, for many years, compulsory to cut all cane green since burning set fire to the peat soil and produced soil conditions deleterious to crop growth. Labour difficulties have resulted in the burning of cane being allowed, but special gangs have to be employed to put out soil fires with portable fire fighting equipment. Another problem is that of minor element deficiency. All the peat lands are deficient in manganese, zinc, boron and copper and it is standard practice to apply these elements mixed with the normal fertilizer.

The Florida sugar lands are criss-crossed with drainage canals which serve a dual purpose. In the wet season they drain off excess water which would otherwise waterlog the soil, while in the dry part of the year water is pumped into the canals to raise the water table so that crops will not suffer from drought.

The United States Department of Agriculture conducts a sugar cane breeding station at Canal Point in Florida for the benefit of both the Florida and Louisiana sugar industries; this has played a major part in their economy. The Station also maintains a world collection of sugar cane varieties and the older farmers from this country would no doubt enjoy seeing, after so many years, the canes which were responsible for the origins of our industry, and which once played a part on our Queensland farms. They are not maintained through sentiment alone. Some are used in cane breeding; others are being studied for any inherent value they may possess in breeding programmes; and all are available to any country which desires to use them either as commercial or breeding types.

The final port of call was Natal in South Africa, where one might be excused from expecting to see a sugar industry somewhat similar to that in South Queensland. Both areas have an eastern aspect to a big ocean; both are

of similar latitude. Rainfall is of the same order and the seasons have much in common. But there the resemblance seems to end. South Africa has ample native labour with a wage rate which is extremely low on our standards. It is also inefficient in terms of daily output. In consequence of the low wage standard there has not been the same incentive to mechanize the agricultural side of the industry, and most field tasks are still performed manually. The Natal sugar lands, apart from a few first class alluvial flats, are steeply undulating or hilly and this condition will also militate against extensive mechanization. A vigorous mechanization committee has developed many valuable aids to agriculture, but their degree of ultimate adoption by the industry cannot be assessed at present.

Another point of difference lies in almost universal conservation of trash as a blanket on the soil surface. Queensland farmers have become so used to pre-harvest burning that a trash layer on the soil is now rarely seen except on an Experiment Station trash trial. Consequently some time was spent in exploring the reasons for the different practice in Natal.

Admittedly, even before labour conditions forced pre-harvest burning on our industry, Queensland growers were not particularly interested in trash conservation. They saw little advantage in the method and had difficulty in handling and ploughing in the trash with conventional implements.

The conditions obtaining in Natal are the clue to the procedure adopted. Firstly, the cheap labour makes handling practicable where trash has to be relieved from the cane rows. Secondly, the climate and topography makes it a desirable practice, whereas it is debatable whether it would show economic returns in Queensland. In Natal the coastal strip on which cane is grown is deficient in rainfall as well as being subjected to strong drying winds for much of the year. Under such conditions a trash blanket cuts down evaporation of soil moisture. In addition the potash in the trash supplements the soil supply which in many localities is known to be deficient.

South African sugar mills are modern and in some cases much larger than Queensland ones. Tongaat, for instance, can crush 4,500 tons of cane a day and manufacture 120,000 tons of sugar in a season. Some factories have developed fine community centres where, in addition to extensive staff housing, there may be seen school, church, store, etc., as well as such amenities as golf course, bowling green, swimming baths, tennis courts and children's playground.

Where irrigation is practised it is from coastal rivers which normally flow in deep gorges. One plantation possesses a fine electric pumping station in such a gorge with an output of 20 million gallons a day; the water has to be raised 490 feet to the plantation. A not unusual sight on some of the hillier lands is to see large irrigation spray units watering cane in locations where furrow irrigation would be almost impossible.

I have made no reference in this talk to my visit to Hawaii, perhaps because that industry is fairly familiar to Australian sugar interests. Suffice to say that it approximates ours in size, that its field efficiency is high, but that its cost of production gives reason for alarm. Only the existing high standard of technical efficiency makes it possible to compete with sugar grown in some other countries by less well paid labour.

One is naturally asked on return from other sugar producing countries how future trends in those places may affect our industry. The world supply and demand sugar position is a complex one, but in terms of straight out production some observations are possible. Hawaii has little, if any, suitable land for expansion and it is unlikely that sugar production will rise appreciably above present figures. The British West Indies could increase output to some extent, but there does not appear to be any move to go beyond the export quota under the British Commonwealth agreement. Florida and Louisiana produce sugar for American domestic use only and are, in fact, subsidised indus-

tries; it is not likely that they will expand. South Africa is increasing production both to supply home requirements and to fulfil its quota of 200,000 tons to Great Britain. The industry there is reaching north where suitable lands and irrigation supplies exist.

None of these countries has the same potential for expansion as Queensland, where much suitable land is still available. But what of Colombia? There the land exists in large quantities, the climate is ideal for sugar growing and production methods are efficient. Who knows what effect this relatively unimportant sugar producer may have on the world's sugar market in the future.

New Fertilizing Machines in the Mackay District

By C. L. TOOHEY

The advent of both new and increased assignments has accentuated the search for faster and more efficient means of handling all farm problems. The following description of two new fertilizer machines at present in use in the Mackay district may be of interest to all cane growers.

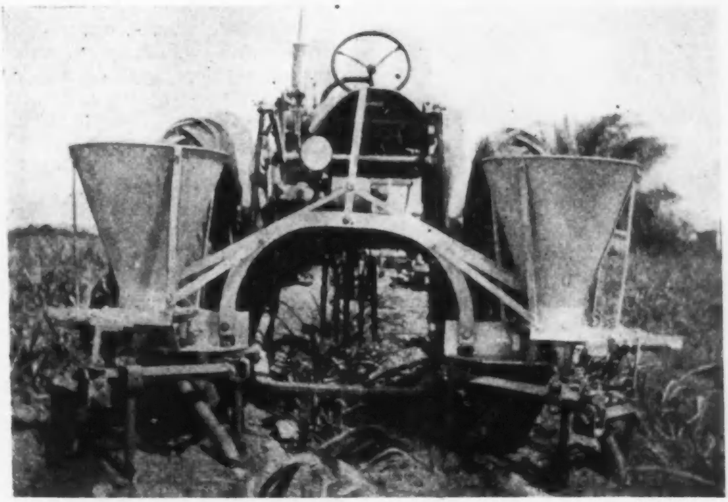

Fig. 37—The Mackay manufactured fertilizer distributor for two-row fertilizing.

The fertilizer distributor in Fig. 1 is manufactured in Mackay, and is built on a frame which may easily be affixed to or detached from any grubber frame by means of five bolts. It is available with either single or double hoppers and the hoppers may be of 95 lb. or 200 lb. capacity.

Distribution of fertilizer is performed by the familiar star feed arrangement which is rotated by an axle chain driven from the rear wheel of the tractor (Fig. 2). Two vertical steel plates, two inches in diameter, placed at a slight angle to and in close conjunction with the star feed crush any lumps, thus ensuring an even feed to the two slot adjustments which are locked at the desired opening. The adjustment of this opening may be made fine enough to allow for the application of only a few pounds of

BHC per acre, or more than large enough for the application of fertilizer. Dual hoses feed the fertilizer to opposing sides of the stool.

A feature of this distributor is the automatic breaking of the drive when the implement is raised hydraulically. A rope attached to the tractor drawbar and led over a small roller to a spring loaded handle tightens as the implement is raised, drawing forward the handle, the opposite end of which disengages the driving drum. A second rope from the handle to the tractor seat may be used manually to disengage the drive in the event of a large miss on a cross drain. Loss of fertilizer when the tractor is travelling on headlands is eliminated.

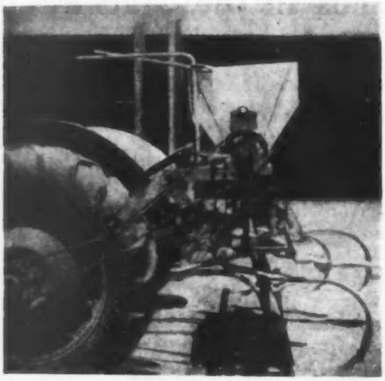

Fig. 38—Side view of the Mackay distributor showing drive from rear wheel.

The extension of two galvanized iron flaps from the bottom of the hopper to the star, and over the top of the crusher bars, mean that at any time only that amount of fertilizer held by the opposing tooth of the star will be forced down the delivery chute. With the addition only of the time taken to fill the hoppers, it is thus possible to fertilize that area of ground which can be covered by double cultivation in a working day.

A second fertilizer distributor at present in popular use in this district is manufactured in Mossman. It is adaptable to any tractor, the machine being chain driven from the rear wheel. A wooden hopper with a capacity of 280 lb. is divided into two compartments through which passes a revolving rod carrying six arms, ensuring a continuous flow of fertilizer to the bottom of the chute and preventing packing. In one instance an extremely lumpy ratooning mixture was handled satisfactorily and the correct delivery achieved with the machine. The fertilizer is then forced through the openings by means of a worm at the bottom of the chute. Adjustment to the size of the delivery slots is made by a length of flat iron controlled by a spring loaded handle extended almost to the driving seat of the tractor, and the adjustments may be made to a fine degree.

A second spring loaded handle is operated by the tractor driver to disengage the driving drum from the ratchet and chain drive when travelling on the headlands, etc. The delivery slots are completely closed to prevent discharge of fertilizer while the machine is stationary, or turning into a new drill. A constant tractor speed produces best results with this machine. It is conservatively estimated that the machine is capable of covering 15 acres in an eight hour day. Both machines form a welcome addition to the mechanization of the industry.

Fig. 39—Side view of the Mossman machine.

The Fairymead Plant Cutting Machine

By C. A. REHBEIN

Over the past few years many improvements have been carried out on farm implements to either lighten the burden or increase the ease of handling for each specific task. With the introduction of mercurial fungicides for use against pineapple disease farmers who knew this disease to be present or wished to protect the setts against unfavourable conditions had to revert to the cutting of their planting material by hand instead of using the modern cutter planter.

Fairymead Plantation, which has always carried out the operation of hand cutting and bagging of plants, found that rising costs necessitated a change in this method, and has evolved a machine which, although perhaps not within the reach of individual growers, is contributing a good deal to the economy of their field programme.

The unit utilises the mobility and power of a Farmall " H " tractor and consists of a dual cutting, dipping and bagging device. On either side of the tractor a moveable 18 inch circular saw with a stationary carriage is mounted adjacent to and level with the base of the radiator and driven by a series of belts and pulleys from the power take off (Fig. 1).

Fig. 40—Showing the circular saw plant-cutting unit mounted on the tractor. The Aretan tank can be seen between the saw and the rear wheel.

A chute under the saw delivers the setts into a galvanized iron container, five feet long, eight inches wide and one foot nine inches deep with a capacity of from 20 to 25 gallons of Aretan solution. This is situated adjacent to the crank case and extending from just below the saw to below the seat of the tractor. Attached to the rear of the container is a sloping tray which allows for the return of the excess solution on the setts. A con-

tinuous slat conveyor, also driven from the power take off and controlled by fibre clutches, extends the full length of the tank up the sloping tray to the rear of the tractor. A level portion, five feet in length, and approximately six to eight inches below the surface of the Aretan solution, allows reasonable time for dipping, whilst the five feet of incline assures drainage. Delivery from the conveyor to the bags is made possible by a two way chute which enables the full bag to be removed while the other is being filled. (Fig. 2).

Fig. 41—This shows the elevator, and the bags being filled with dipped plants.

A 44 gallon storage tank is positioned on a platform in front of the tractor radiator and contains the solution of Aretan ready to replenish the tanks when needed.

Normal practice carried out in the field is to have the cane stripped and laid in two lines of large bundles so that the machine may be driven between these to eliminate long distance carriage of the cane. Six men are required to manipulate the unit at full capacity, positioning three men to each component, one to load the carriage, one to work the saw, the third removing the bagged plants. Approximately two bags per minute are turned out by each component of the unit which necessitates the employment of between 50 and 60 men cutting, stripping and bundling the cane ready for use.

Although this combination and contraction of three processes into a small mobile unit has the disadvantage of monopolising the entire use of a tractor for one particular task it serves to illustrate the initiative and ingenuity of those engaged in the sugar industry and may lead to the construction of a more flexible and reasonably cheap counterpart within the reach of a group of growers or even the individual farmer.

Bagasse Application to a Mackay Soil

In the October, 1953, issue of this BULLETIN mention was made of the application of bagasse to cane fields in the British West Indies. It was considered that a similar procedure was worthy of investigation in some Queensland districts where shallow soils and clayey subsoils existed. Since that time a bagasse experiment has been established at the Mackay Sugar Experiment Station where the soil conditions are such as to lend themselves to the investigation.

The soils of this section of the Mackay area are mostly shallow and underlain by impervious clays which impede root development and accentuate the naturally poor drainage of the district. It is felt that the mellowing effect of a fibrous material like bagasse may contribute to an improvement in soil physical conditions.

During the spring of 1953 bagasse at the rate of over 40 tons per acre was spread over the surface of portions of a block which had been fallow since the previous year. Following the spreading of the material a heavy ripper worked through the bagasse layer and broke up the soil to a depth of 22 inches.

The photographs show the bagasse being applied and also the operation of the deep ripper. Records of germination and early growth will be kept, and At the same time other sections of the block on which no bagasse had been applied were ripped to the same depth. Still other sections were not ripped.

This was done to allow some of the bagasse to flow down the cuts made by the ripper tynes and to mix to some limited extent with the subsoil layer. ripping alone. Extra sulphate of ammonia was applied at planting time to allow for any nitrogen shortage where bagasse had been spread.

The three treatments will allow comparison between (*a*) normal farm practice and deep ripping, and (*b*) ripping after application of bagasse and it will be of considerable interest to observe how the deeply cultivated and bagasse treated areas behave during both wet-season and dry periods.—N.J.K.

Fig. 42—Heaps of bagasse ready for spreading on the field.

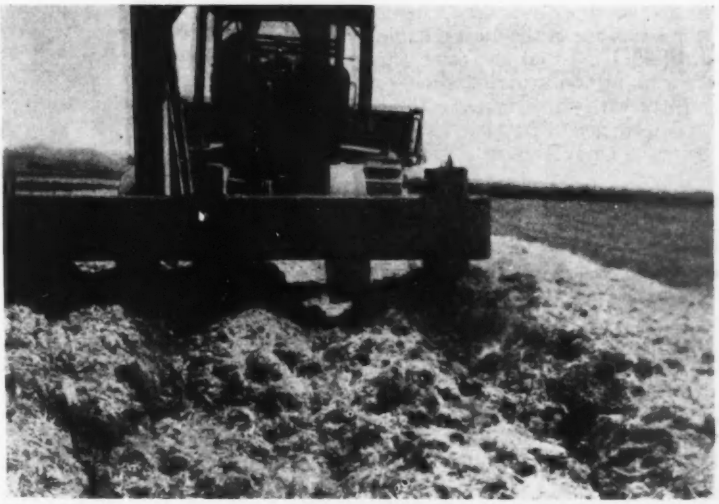

Fig. 43—The ripper operating to a depth of 22 inches after the bagasse was applied. The bagasse could be seen flowing down the gashes made by the ripper.

Clean Cane for Combating Ratoon Stunting Disease

By R. W. MUNGOMERY

Some years ago when ratoon stunting disease was first known to be causing serious losses in Q.28 in the Mackay district, efforts to control the disease were directed mainly towards the selection of healthy planting material from well-grown, even crops that had been grown under unirrigated conditions; in addition, in order to avoid contamination of this planting material, growers were warned against using cane knives, planters and cultivating implements that had not been thoroughly sterilized. This is still the recognised method of combating the disease.

One of the earliest difficulties associated with the selection of healthy plants was the fact that apart from the final pronounced stunting which the crop suffered, no definite diagnostic symptoms had been discovered that would serve to indicate the presence of the disease. Later investigations, however, went to show that, when the cane was cut lengthwise with a sharp knife, the appearance of a number of small orange-red dots or short streaks in the lower portion of the densely-packed, hard, nodal fibres was one of the most reliable means of indicating that the cane was affected with ratoon stunting disease. Concurrently with these investigations it was determined that the disease could be cured by subjecting either the sett or the entire stalk to a hot-water treatment at 50° C. (122° F.) for two hours.

More recent surveys in other parts of the State disclosed that ratoon stunting disease was widespread and causing considerable losses in a number of other varieties, notable amongst which was the variety Trojan. Moreover, the distribution of the disease was such that all of the commercial canes were suspect, and in effect this meant that it would be necessary to start from the beginning and build up clean stocks by hot-water treating representative amounts of each variety. Such initial plantings would be expected to serve as the nuclei from which further propagations could in turn be made. It was realised that because of the accurate temperature control required, hot-water treatment could not be carried out by individual growers, but that this was a matter to be undertaken as a district-wide project by each Cane Pest and Disease Control Board working in close co-operation with the local mills for the provision of the necessary heating facilities.

Some Boards readily shouldered their responsibilities, getting away to a good start in the spring of 1952, and since then they have conducted a vigorous campaign by hot-water treating as much cane as possible during the restricted planting season. Already they have been able to propagate from their originally treated stocks and one of the most outstanding efforts in this direction has been made by the Inkerman Cane Pest and Disease Control Board, which expects to have approximately 10,000 tons of clean cane available as a source of plants in 1954. Other Boards commenced their operations only towards the end of last winter and in consequence the amount treated to date has been rather limited.

With regard to distribution of this clean cane, some Boards decided to retain control over the whole of their treated stocks until there is ample to meet the requirements of all their growers—a policy which has considerable merit. On the other hand, other Boards treated small quantities individually for those growers who were sufficiently interested and far-sighted to provide themselves with clean planting material.

It is, of course, realised that the amount of clean cane so far provided is insufficient to meet the planting requirements of all growers, and until sufficient stocks are available growers must necessarily choose their planting

material from the best of what is on hand, even though it may be suspect. However, this state of affairs will be allowed to continue only while clean cane is unobtainable. **As soon as adequate stocks of healthy plants are readily procurable it will be expected of growers that they make their plantings wholly from clean sources,** much in the same manner as they did in past years when combating gumming, downy mildew and Fiji diseases. **Hence the next year or so is to be regarded as an interim period during which each grower should provide himself with sufficient clean stocks from which he can make his future plantings; otherwise he will be obliged later on to purchase his full requirements from outside sources, for under no circumstances will the planting of diseased cane be sanctioned once ample clean cane is available.** As stated previously, some Boards have made an excellent effort in providing large quantities of clean plants, and in those areas where these large stocks now exist, it is the duty of the growers concerned to avail themselves of the opportunity offered by planting as much clean cane as possible during the coming planting season. This is not a matter in which it would be expected that growers would show any marked hesitancy. The advantages to be derived from the production of heavier plant and ratoon crops have already been amply demonstrated in the case of Q.28, and several other varieties are likely to show a sharp upward trend in production once the switch over is made to clean stocks.

During the last planting season a number of demonstrational strip plantings of healthy versus diseased cane were made in all of the main sugar-producing districts of Queensland. Results so far indicate that the healthy cane germinated faster and more completely than the diseased cane, while the stooling also was superior. In many instances the differences were so spectacular as to have influenced a number of growers to secure as much clean cane as possible to take care of their future planting requirements. Once these advantages become more widely known the demand for clean plants will undoubtedly increase to a point at which all plantings will ultimately be made from clean sources only.

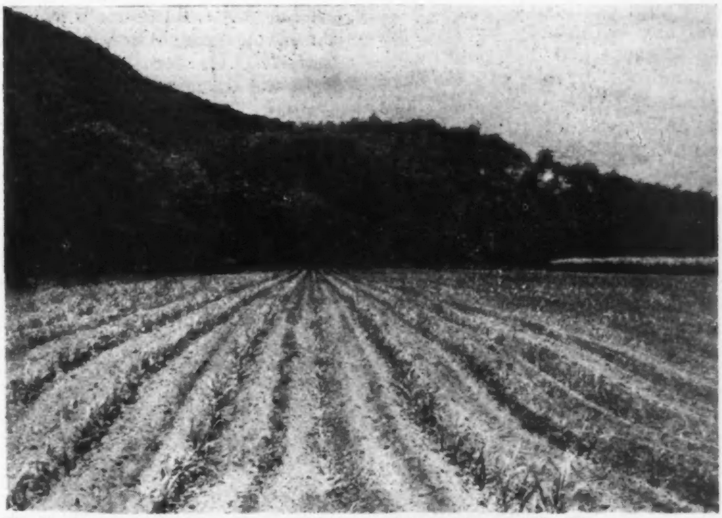

Fig. 44—Centre row is from plants which were not hot-water treated. The one row to the right and the several rows to the left are from stocks hot-water treated in 1952.

Hot Water Treated Cane Plants *versus* Untreated

By E. A. PEMBROKE

The years since World War II have witnessed the invasion of chemistry into the field of agriculture and cane growers have been asked to accept as commonplace words such as benzine hexachloride, Aretan, hormone weedicides, 2,4-D, and the like. Farmers generally were to the fore in accepting and utilising these new chemicals for crop protection, and once recommendations could be made and machines produced to apply the protective materials, the operations became relatively simple.

During recent months, however, the cane-growers of Queensland have witnessed the introduction of a method of cane treatment which their forebears would have rejected as having no place in practical agriculture. Most mills have now installed steam heated tanks for the treatment of cane setts in water at 50 degrees C. for two hours as a control against ratoon stunting disease. The method, though time consuming and laborious, has been accepted with goodwill and enthusiasm by growers. Despite setbacks and disappointments many hundreds of tons of cane have been treated at Queensland mills, and farmers are waiting impatiently for the results of their labours.

As a preview of things to come it is noted in North Queensland that plantings made this year from cane treated in 1952 gave more rapid germinations, more vigorous early growth and better and earlier stooling than those of untreated cane. One such planting was made on the farm of Mr. L. Townson in the Mulgrave Mill area.

The " clean " Pindar was hot-water treated in September, 1952, and the resultant crop used for plants in August 1953. The " untreated " Pindar was obtained from a May, 1952, plant crop and planted at the same time. Since the " untreated " cane was much older, only the top half of the stick was used; the butts were considered unsuitable as planting material. The cane from both sources was Aretan treated at planting.

After planting, the clean Pindar germinated from seven to ten days earlier and all eyes emerged within a short period; whereas the untreated Pindar was much slower in completing its germination. When the photograph was taken, one month after planting, differences in early vigour were outstanding and the clean Pindar had commenced to stool.

The centre row contains "untreated" Pindar flanked by one row of clean Pindar on the right and several rows on the left. The remaining rows on the right are untreated Pindar.

Whilst the results from this planting are spectacular and encouraging a good deal of experimental data has yet to be collected in order to assess, in terms of sugar per acre, the increased returns growers can expect from the amount of time and labour involved in ridding their crops of this widespread disease.

The Sugar Content of Standover Cane

When the variety P.O.J.2878 became prominent in South Queensland in the mid-thirties, its principal value to the industry lay in its ability to standover satisfactorily. It was capable of continuing its normal growth throughout a second year and of producing a crop at the beginning of the crushing season with a very favourable sugar content. This was in contrast to its sugar content at the start of the previous crushing season, when it would have been some ten months old.

Although this feature of P.O.J.2878 was well recognised, and advantage taken of it in farm planning, little information was available regarding the c.c.s. trend during the second year of growth. It is normally accepted that, towards the end of the harvesting season, when storms and wet season rains begin, the new burst of growth causes a drop in sugar content. In an endeavour to assess what occurs with standover cane a block of P.O.J.2878 and a block of Trojan were selected in June, 1952, and monthly stalk samples analysed for the following year.

The Trojan was a September, 1951, plant crop and was, therefore, nine months old when sampling began; the samples were taken until July, 1953, a period of thirteen months. The P.O.J. 2878 was a first ratoon block, the plant crop from which was cut in September, 1951; sampling started in June, 1952, when the cane was nine months old, and continued until June, 1953. The c.c.s. figures for butts and tops in each case are shown in the table.

Trojan Plant standover.
Planted 25/9/51.

Date Sampled	Butts	Tops	Average
25/6/52 ..	10.50	1.85	6.16
15/7/52 ..	12.00	5.40	8.70
20/8/52 ..	15.65	10.50	13.07
19/9/52 ..	15.50	12.90	14.20
17/10/52 ..	16.50	13.50	15.00
21/11/52 ..	16.70	12.60	14.65
17/12/52 ..	17.05	11.30	14.18
13/1/53 ..	17.70	14.10	15.90
14/2/53 ..	16.95	11.90	14.23
17/3/53 ..	16.35	11.10	13.72
17/4/53 ..	16.10	10.90	13.50
26/5/53 ..	16.10	12.15	14.13
16/6/53 ..	16.40	12.00	14.20
10/7/53 ..	15.50	12.70	14.10

P.O.J.2878 1st Ratoon standover.
Ratooned Mid September, 1951.

Date Sampled	Butts	Tops	Average
13/6/52 ..	12.20	3.20	7.70
18/7/52 ..	13.01	7.15	10.08
5/9/52 ..	14.80	9.60	12.20
1/10/52 ..	15.20	9.10	12.15
17/10/52 ..	15.70	11.90	13.80
21/11/52 ..	15.60	12.50	14.05
17/12/52 ..	15.80	12.40	14.10
13/1/53 ..	14.90	12.50	13.70
14/2/53 ..	16.90	14.10	15.05
17/3/53 ..	16.20	14.90	15.05
17/4/53 ..	15.40	14.10	14.75
26/5/53 ..	16.00	14.90	15.45
16/6/53 ..	15.60	15.40	15.50

The Trojan figures show that the lower half of the stalk reached a peak in January and that a slight though appreciable drop occurred from then until July. The top half, on the other hand, was practically as high in July as at any period in the second year of growth. The average of tops and butts followed the trend of the bottom half alone, showing a January peak and a drop of 1.8 units between then and July.

In the case of the P.O.J.2878 both butts and tops showed a steady increase in c.c.s. from June, 1952, to June, 1953; the minor variations in the butts are probably not significant. The average of the two, representing the whole stalks, reached a peak in June, 1953, when both butts and tops had almost the same sugar content.

The value of standover P.O.J.2878 for early cutting is very obvious from the results on this block, and the figures indicate that southern mills could start the season at a much earlier date providing there was an adequate supply of standover cane.

Surface Mulching of Crop Residues in Ratoons

By E. BLUNDELL, Canegrower, Daradgee.

[**Editorial Note.**

Trash conservation has been the subject of Bureau experimentation and investigation for over twenty years. Although no appreciable results have been obtained on a red volcanic soil at Bundaberg it is not claimed that benefits will not accrue in a different environment, on different soil types or by a different mode of conservation. In recent years another trash experiment has been carried out on the Mackay Sugar Experiment Station, and perhaps there the final results will be at variance with the Bundaberg experience. Mr. Blundell, by personal experimentation on his own farm, has achieved results which cannot be ignored and, in the following article, he describes concisely his experiences and methods. Already his practice is being followed by other Daradgee farmers. Elsewhere in this issue a bagasse experiment is described; this material could be used similarly to trash, and is well worthy of trial.]

Introduction.

The method, to be described, of conserving the residues left after cutting burnt cane crops has consistently given good results on red volcanic soil on the writer's farm at Daradgee, in the Innisfail district, where the rainfall averages about 140 inches per year. The land on this farm is gently undulating and the lower portion borders on a swamp from which the waters often invade the cultivation during the wet season. However, these floodings do not leave behind them any beneficial deposits of silt.

Fig. 45—Showing the method of raking tops into every second interspace. Grubber tynes break up the soil on each side of every cane row.

Field Operations.

Tops left after harvesting were raked into every eighth interspace with a hay rake. The windrows of tops so formed were then straightened by manual labour, a ten acre field taking about 1½ units. The field was then ratooned, using a grubber with two tines straddling every cane row, one tine on each side. Fertilizer was applied at the rate of 4½ cwt. per acre of Sugar Bureau No. 2 mixture in the furrows left by the grubber tines plus 1½ cwt. of sulphate of ammonia on top of the cane rows; both trash and non-trash received the

same fertiliser treatment.

With a full set of tines on the grubber, all clear interspaces were then grubbed to a depth of eight inches, using an interspace tractor. No grubbing was done in the inter-rows with trash except that done when ratooning. The clear inter-rows were scarified as necessary to control weeds.

When the ratoons were three months old the trash rows were lightly rotaried to a depth of one inch in order to incorporate some soil with the trash as a safeguard against floating away during flooding, which often occurs in parts of this field; also, by bedding down the trash, its decomposition was hastened.

Effect of Treatment.

As the growth of the ratoon crop progressed the beneficial effect of the trash mulch became more and more apparent, the two rows lining the trash showed the greatest benefit, but the second rows away from the trash were also better than those three away. This effect was so striking that it was decided to make field weighings to determine the differences in terms of tons per acre. These weighings were carried out by Mr. Simpson, the Technical Field Officer at Goondi Mill. Two chains of row were weighed for each individual tons per acre determination. The pattern of these weighings is shown below:—

3 .. .. .. Third row
2 .. .. .. Second row
1 .. .. .. Trash row

TRASH

1 .. .. .. Trash row
2 .. .. .. Second row
3 .. .. .. Third row

Fig. 46—An interspace tractor grubs the clean interspaces. This operation is carried out subsequent to the cane row grubbing which is done by straddling the rows.

TABLE 1—Effect of Trash Mulch: tons per acre.

Test Weighings at random	No Trash	Intermediate	Trash	Increase from Intermediate over no trash	Increase from trash over no trash
1	33.7	37.1	47.2	+3.4	+13.5
2	25.7	29.3	38.7	+3.6	+13.0
3	26.9	24.7	34.7	−2.2	+ 7.8
Totals	86.3	91.1	120.6	+4.8	+34.3
Averages	28.8	30.4	40.2	+1.6	+11.4
Per cent increase over no trash ..				5.5	39.5

TABLE 2—Effect of Trash Mulch: Stalks per half-chain of row.

1	182	198	213	+16	+31
2	159	173	191	+14	+32
Totals	341	371	404	+30	+63
Averages	170½	185½	202	+15	+31½
Per cent. increase over no trash ..				8.8	18.5

Discussion.

These results are very striking and clearly show the benefits of this method of conserving crop residues. In recent years the method has been modified so that now the residues are raked into every alternate inter-row, thus spreading the benefit uniformly and producing a more even stand. The cane cut from this farm in 1952 averaged 48.4 tons per acre for approximately equal acreages of plant first and second ratoons. The overall average for the Daradgee red soil area was 28.8 tons per acre. In attaining this high average, fertilizer applications were kept to moderate levels as follows:—

To plant cane, 4½ cwt. Sugar Bureau No. 2 per acre with no sulphate of ammonia.

To first ratoons, 4½ cwt. Sugar Bureau No. 2 per acre with 1½ cwt. sulphate of ammonia.

To second ratoons, 4½ cwt. Sugar Bureau No. 2 per acre with ¾ cwt. sulphate of ammonia.

Applications made during the preceding year were of similar quantities of mixture plus an average of 2¼ cwt. of

Fig. 47—Partially decomposed tops in the interspace. The rotary hoe has lightly mixed some soil with the tops.

sulphate of ammonia per acre. Good crops of green manures have always been grown during fallow periods.

While utilising trash in the manner described, the writer has always been on the lookout for signs of nitrogen deficiency in the growing crops, but such have been conspicuously absent. The writer holds the opinion that trash decomposing on the surface actually builds up the available nitrogen; whereas, when ploughed or deeply rotaried under, plant or ratoon crops immediately following show marked signs of nitrogen deficiency unless applications of sulphate of ammonia are made to correct this condition.

When crop residues are used in the manner described the cane covers in better, has greater length of stalk, more stalks per stool, and stands up to dry weather better.

As a result of many years of experience with various ways of using trash, including ploughing in, rotarying in and leaving on the surface, the writer considers that it is detrimental to growing crops of cane to plough or rotary trash in in the inter-rows. Crops so treated give reduced tonnages, but the following crop will show a slight improvement if the treatment is not repeated the next year. However, if the trash is left on the surface better growth is noticed, looking either along the cane rows or across them. The soil condition improves and the earth worm population increases with resulting improved aeration of the soil. It is advisable to place the next year's trash in the same interspaces as the previous year's because exposure of a previous year's trash row to the sun results in the loss of quite a lot of its residual value, particularly as regards the breaking down of the crumb structure which builds up under a trash mulch.

A widely held belief amongst growers is that trash conservation adds greatly to farm labour requirements. However, the experience on the farm under discussion is that it actually reduces operations. The time taken to hand roll the unusually large amount of residue left after the heavy 1952 crop into every alternate inter-row took one man twelve eight-hour days to cover 23 acres. Against this, cultivation and grubbing for weed control is reduced by half and this more than compensates for the time taken in rolling the trash. For those who might find it difficult to appreciate the labour saved, another aspect is that the gain in crop—in the case of the writer's farm, some 20 tons per acre over the district average—would allow of the profitable engagement of casual labour for the specific purpose of rolling the trash.

The Caking of Fertilizer

Overseas literature indicates that the caking of fertilizer, so familiar and so obnoxious to the Queensland cane grower, is the subject of considerable study by manufacturers in other countries than this. The Monsanto Chemical Co. of St. Louis, Missouri, U.S.A., in one of its magazines, discusses the possibilities of one of its products for prevention of the setting of fertilizer in bags. An extract from the article reads as follows:—

" Tests under various temperatures and humidities show Monsanto's spray dried Santomerse No. 1 keeps mixed fertilizer from caking in the bag or in the manufacturer's curing bin.

"Addition of the detergent reduces surface tension in the liquid ingredients added to the fertilizer in the manufacturing process, making them ' wetter ' and permitting them to penetrate the dry ingredients quickly and completely. This speeds the reaction of the dry ingredients and stops subsequent caking.

" One manufacturer follows the practice of putting a pound of light density Santomerse No. 1 in each ton of its fertilizer. The fertilizer then remains fine-grained, flows freely and is of uniform quality. It must be cured or ' aged ' only three days as compared with the former 60 days."

Another American firm which handles diatomaceous earth, used widely as a filter aid, has reported on its successful use as a hardening preventative in bagged fertilizer. They state:—

"As a fertilizer conditioner Celite 379 is recommended in amounts from half to three per cent. by weight. This amount is best determined by the manufacturer. Some of our domestic customers use about half per cent. by

weight in fertilizers that are sold late in the year and frequently stored over the winter in the farmers' barns. The customer reports very favourably on his use of Celite. It is recommended that Celite for best results be added only to cured fertilizers prior to bagging."

The alternations of humid and dry atmospheric conditions on the Queensland coast probably accentuate the caking problem, but there is hope for the solution of the "hard fertilizer" problem by the use of such substances as those mentioned above. We live in an age of extraordinary technical achievement and one is justified in having a degree of optimism regarding the most difficult problems.—N.J.K.

Rain Making in the Sugar Belt

The arrival in Bundaberg in August, 1953, of a rain making team aroused more than passing interest among sugar cane growers in that area. Fairly extensive publicity has been accorded to the rain-making experiments carried out in Australia by the C.S.I.R.O. and the sometimes confusing press statements have left in the public mind a degree of doubt as to the value of such work.

In a recent issue of Rural Research in C.S.I.R.O. the following statement appears:—

"**Practical Results:** The amount of rain which can be artificially precipitated over a given area will depend upon how often and for how long cloud conditions are suitable. Various considerations lead to the conclusion that with the dry-ice method as used in south-eastern Australia the increase in annual rainfall over a given area would not exceed 5 to 10 per cent. In C.S.I.R.O. experiments over the Tasmanian hydro-electric catchment area in 1950, increases obtained by the method certainly did not exceed that figure.

It is clear that existing methods will not allow large-scale modification of rainfall on an economic basis. But the situation might be vastly different in special cases where a small increase in rainfall at a critical time or place could result in a disproportionate increase in, say, the production of some agricultural commodity, such as wheat.

For example, Professor S. M. Wadham has stated that the yield in wheat in the Victorian Mallee is closely correlated with the August-September rainfall, to the extent that each additional half-inch of rain falling during that critical period results in the production of an extra £1,000,000 worth of wheat. It is in such situations as this that rain-making methods already developed might in due course prove extremely profitable.

Basic research on the physics of rain and clouds must precede further advances in practical rain-making. The results obtained so far are sufficiently promising to justify hopes of further progress in the future.

The stakes are high and even limited success might bring enormous economic benefits to the nation."

Cane growers will be in full agreement with Professor Wadham's comment. An increase of 5 or 10 per cent. in annual rainfall in, say, Bundaberg, would not be of great value if spread over the year, but one or two inches of rain, produced at a time when crops were suffering seriously from drought conditions, could mean a great deal of money to the district. How often have South Queensland cane growers waited so long for spring planting rains that planting had to be delayed until the following year? A couple of inches in September in such a year would be worth a lot to the industry; the actual value would be impossible to assess.

N.J.K.

A Comparison of Q.50 and C.P.29/116 on Red Volcanic Soil at Bundaberg

By L. G. VALLANCE

The results which were obtained from a fertilizer trial, harvested on Bundaberg Sugar Experiment Station at the end of September, produced some interesting comparisons between the two varieties, Q.50 and C.P.29/116. The cane was planted during the last week in February, 1952, and was therefore about 19 months old when cut. The trial was primarily designed to investigate the effect of different amounts and times of application of sulphate of ammonia as a top dressing, but since the response of the ratoons to the different treatments has yet to be obtained the experiment is not yet complete, and therefore the effect of the variations in fertilizing will not be discussed at this juncture. However, the preliminary results of the trial are very interesting since they demonstrate the value of Q.50 for early harvest.

When the plant crop was harvested (end of September, 1953), the yields of the two varieties and their c.c.s. contents were as given below. Assuming the value of sugar to be £43 per ton, the gross returns per acre, less harvesting costs (13/4½ per ton) and cartage (4/- per ton) have also been calculated. It should be noted that the c.c.s. analyses were done on juice extracted from the cane by means of the small sample mill and are therefore somewhat higher than would be the case at the large mill.

Variety	Cane tons per acre	c.c.s.	Gross Monetary Return per acre
Q.50 ..	36.72	16.29	£148
C.P.29/116	42.04	14.04	£133

It will be seen that although C.P. 29/116 outyielded Q.50 by 4.68 tons of cane per acre, the higher sugar content of Q.50 made it a much more profitable crop to grow since its gross return was about £15 per acre greater than that of C.P.29/116.

Early Sugar.

A marked characteristic of Q.50 is its ability to produce good sugar early in the season. This is a most important feature, which was very noticeable in the trial. Both varieties were analysed for sugar content early in July and August and the results obtained indicated that the differences in favour of Q.50 at these times were even greater than that previously mentioned for the end of September. This is evident from the following:—

Variety	c.c.s. on 8th July	Gross Monetary Return per acre
Q.50	13.59	£110
C.P.29/116 ..	11.11	£85

At the beginning of this year's crushing season, therefore, Q.50 was returning about £25 per acre better than C.P.29/116. In August, also, the superior early sugar of the former variety was again apparent, being worth about £34 extra per acre, *e.g.*:—

Variety	c.c.s. on 5th Aug.	Gross Monetary Return per acre
Q.50	15.43	£136
C.P.29/116 ..	12.15	£102

Importance of Q.50 in Southern Districts.

The value of C.P.29/116 for many of the southern districts is well known because of its productive capacity under less favourable conditions and its ability to yield good tonnages of sugar in mid and late season harvests. However, it suffers a definite disadvantage

in that its early sugar content is undeniably low.

Q.50 is also a vigorous growing variety and a good producer under relatively poor conditions. In this respect it does not differ greatly from C.P.29/116, but there is no doubt that Q.50 is capable of yielding a much superior tonnage of sugar at the beginning of the season. There is little need to stress the importance of this fact and it is anticipated that acreages planted to Q.50 in the southern districts will rapidly become appreciable.

Because of the expected increase in the planting of Q.50, it must be pointed out that it is **not recommended for late harvesting.** This is due to the susceptibility of the mature cane to red rot during the late spring and early summer months. Such an infection may occur in this variety at any time from October onwards, depending upon weather conditions. The disease may render much of the cane unfit for milling by causing a severe drop in c.c.s. content, in which case the advantages recorded above in favour of Q.50 over C.P.29/116 are completely reversed.

Therefore, it is advisable to be forewarned since the improper use of the variety may easily produce unfortunate results. On the other hand, if harvested early, Q.50 will undoubtedly be a valuable addition to the list of varieties available for use in southern Queensland.

Beneficial Effect of Krilium on Mackay Experiment Station

By L. G. VALLANCE

Readers may recall an article in the last January issue of this BULLETIN describing some laboratory experiments with Krilium. It was shown that this soil conditioner had a very beneficial effect when applied to some tough clayey soils which were known to be very difficult to cultivate in the field. When further supplies of Krilium came to hand a series of small plots was put out in various sugar areas in which the conditioner was applied at the rate of 400 lb. per acre. In the majority of these, a noticeable improvement in the physical condition of the soil was obtained.

One such experiment was laid down on a portion of Block C.2 on Mackay Sugar Experiment Station. This silty clay loam soil has always been difficult to prepare for planting and during the final ratoon and fallow period becomes hard and intractable. The land has been cultivated to sugar cane for some 70 years. It is low-lying, but when bedded up and managed properly with respect to drainage it produces good average crops of cane. Some difficulty is experienced in getting the water away fast enough during the wet season and inundation several inches deep is likely to occur for two or three days once or twice during that period.

A crop of second ratoon cane was harvested from the area in September, 1952, the stubble was ploughed out and the land tandem disced in October. The usual green manure crop of velvet bean was planted in the second week of November, but this was removed about a month later from the portion of the block to which the Krilium was to be applied and also from an adjacent check area. The Krilium was broadcast by hand on 5th December and disced in to a depth of about four inches. Heavy rains in January, 1953, inundated the block for short periods and the area then remained undisturbed under grass and weed growth until ploughed in October, 1953.

At this ploughing the difference in physical condition between the treated and untreated areas was very marked and the following observations, made by Mr. C. G. Story, Officer in Charge of the Experiment Station, give a clear

picture of the beneficial effect of the Krilium. He says:—

"(1) It was no effort for the plough discs to cut and turn the furrows in the Krilium area; it handled this section as though it was a second ploughing of the area within a short period. At the ploughing depth of six inches the soil broke away in a slice from No. 1 disc to the furrow wall and from No. 2 disc to behind the back of No. 1 disc. It was possible to slide my fingers along this small opening of approximately one inch which resulted; the effect of the disc on this soil was to cut a slice as with a mouldboard plough. This was inverted by the disc and broke readily into small aggregates, both on inversion and when it fell against the previous furrow slice; the size of particles was very small compared with the large hard lumps in the check area.

(2) The plough worked in handling the

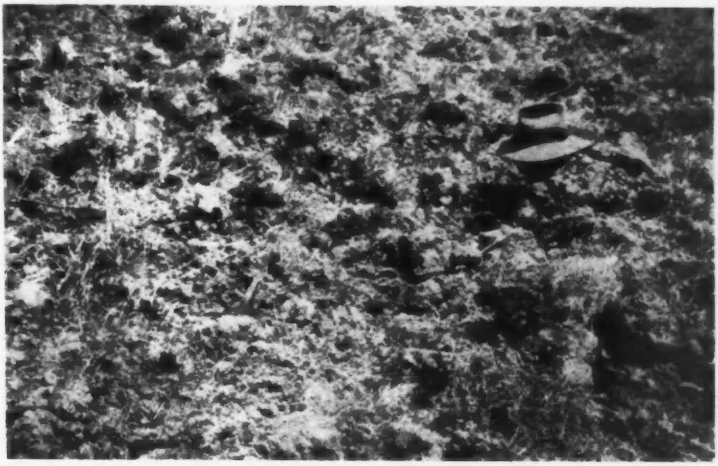

Fig. 48—Soil to which Krilium had been applied a year previously. Land has just been ploughed but not harrowed

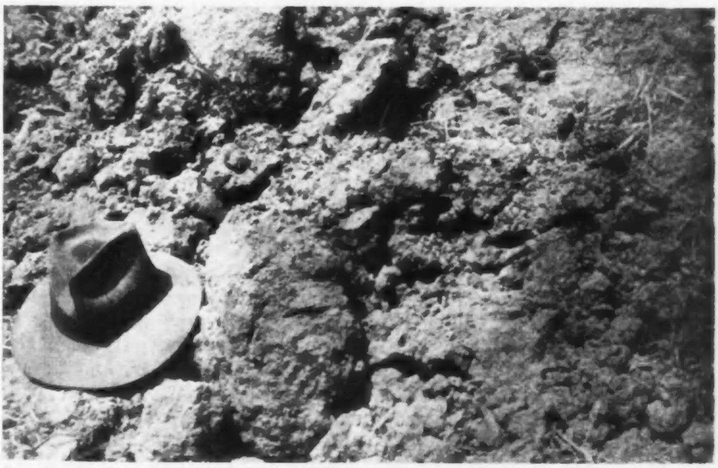

Fig. 49—On the same block this soil did not receive any Krilium. Note large lumps typical of this soil type.

check area; the land was tough, the soil turned over in great hard lumps which did not shatter readily. The plough setting was the same and the tractor speed constant for both areas.

(3) The larger particles in the Krilium area were readily broken up to fine particles by squeezing in the hand, by dropping to the ground, or by standing on them. This did not occur with the lumps in the check area, many of which could not be broken by standing on and rolling.

(4) There appeared to be more moisture in the Krilium particles.

(5) The general differences in characteristics between the soil in both plots were noticeable down to the depth of ploughing.

(6) When ploughing was finished it was evident there were two different sections of ground in the trial area, one composed of large lumps and the other a more friable area with a finer tilth. This is very clearly illustrated by the photographs taken of typical portions of the field (Figs. 1 and 2)."

Soil samples typical of both areas were brought to the laboratory for testing and it was found that the content of water stable aggregates or crumbs in the untreated soil was about 15 per cent. Similar crumbs in the soil to which the conditioner had been applied amounted to 38 per cent. This large increase in aggregate formation was undoubtedly a major factor in the much improved tilth of the portion of the field to which the Krilium had been applied.

It is to be hoped that the time will eventually come when it will be possible to manufacture these soil conditioning chemicals at a price which will allow economic application to the soil on a farm scale.

N.Co.310 in the Bundaberg District

By O. W. D. MYATT

It is anticipated that a general distribution of the variety N.Co.310 will be made in the Bundaberg, Gin Gin and Isis districts during both the autumn and spring of 1954, and since this variety offers growers the desirable characteristics of improved early quality plus a very high resistance to frosting, some advance information on its performance may assist them in determining its suitability or otherwise to their individual varietal requirements.

N.Co.310, a proven South African variety, was introduced to Queensland in 1947 and after the necessary twelve months quarantine period was forwarded to the Bundaberg Sugar Experiment Station in the spring of 1948. As its lettering denotes, N.Co.310 was not raised from seed "set" in Natal, South Africa. It was grown from seed of the cross Co.421 × Co.312 imported to Natal from Coimbatore, India, in 1938.

This variety has had many setbacks since its early trials in the Bundaberg area, the greatest being the high incidence of ratoon stunting disease found in all available plant stocks during the spring of 1952. This made it necessary to cancel distribution arrangements then in hand and to commence a fresh series of propagations with hot-water treated, disease-free, stocks. Reports from South Africa indicate that the variety is susceptible to mosaic, while our disease tests show that it is resistant to both red rot and downy mildew disease.

Fortunately, N.Co.310 proved tolerant to hot-water treatment and treated setts have shown a marked improvement in both striking ability and general growth rate. The variety will go forward to growers next year with a much brighter future than its 1952 counterpart.

It is a thin to medium greyish green cane giving vigorous germination and rapid early growth with heavy and compact stooling. Its habit is erect with excellent cover, and ratooning is strong and reliable. These good early growth characteristics are somewhat overshadowed by profuse and early arrowing, but this is more than compensated for by the high early quality

displayed on all soil types and a resistance to frosting which has shown to advantage on the Wallaville river flats this year.

The following tests, though limited, emphasise the improved quality maintained above local varieties during the earlier harvesting months, a period when extra units of c.c.s. are so vital under southern harvesting standards.

Red Volcanic Soil	June	July	Aug.
Spring plant—			
(1) N.Co.310 ..	9.90	13.60	15.50
Q.50	6.80	10.25	13.15
(2) N.Co.310 ..	12.25	13.27	
Q.55	9.95	11.85	
(3) N.Co.310 ..	10.38	13.13	
Q.47	8.45	10.25	
1st ratoon—			
(4) N.Co.310 ..	14.20	15.30	18.42
Q.47	10.85	12.80	15.60

Grey Forest Soil	June	July	Aug.
Spring plant—			
N.Co.310	10.35	12.12	14.15
Q.47	6.10	8.85	11.65

Red Forest Soil	June	July	Aug.
1st ratoon—			
(1) N.Co.310 ..		12.15	15.30
Q.47		9.90	12.95
Spring plant—			
(2) N.Co.310 ..	14.90		16.20
Q.50	11.85		13.65

Unfortunately this margin of superiority is limited, as the variety appears to reach a maturity peak by mid October and then shows a steady decline accompanied by a marked loss in stalk weight as the season progresses.

Despite a growth period handicapped by early arrowing (approximately one month earlier than C.P.29/116), N.Co. 310 has proved suited to spring plantings under normal seasonal conditions, but offers better prospects from autumn plantings, particularly on the poorer

Fig. 50—Crop of N.Co.310 in the Bundaberg district.

soil types. N.Co.310 cannot be classed as an early maturing cane, nor is it an all-purpose variety, but the good quality it displays marks it as a cane well worthy of consideration in planning future plantings for early harvests.

It is noteworthy that the distribution of this variety planned for 1954 will be made from plant stocks free of ratoon stunting disease and thus marks a further step forward in the Bureau's campaign to eradicate this disease in the shortest possible time.

"THE SUGAR EXPERIMENT STATIONS ACTS, 1900 to 1952"

List of Varieties of Sugar Cane Approved for Planting, 1954

Bureau of Sugar Experiment Stations, Brisbane, 1st January, 1954.

Mossman Mill Area.

Badila, Cato, Clark's Seedling, Comus, Pindar, P.O.J.2878, Pompey, Q.44, Q.50, S.J.4, and Trojan.

Hambledon Mill Area.

Badila, Badila Seedling, Cato, Comus, Eros, Pindar, Pompey, Q.50, and Trojan.

Mulgrave Mill Area.

North of Fig Tree Creek.

Badila, Badila Seedling, Cato, Clark's Seedling, Comus, Eros, Pindar, Q.44, Q.50, S.J.4, and Trojan.

Babinda District.

Badila, Badila Seedling, Cato, Clark's Seedling, Comus, Eros, Pindar, Q.44, Q.50, S.J.4, and Trojan.

Babinda Mill Area.

Badila, Badila Seedling, Cato, Clark's Seedling, Comus, Eros, Pindar, Q.44, Q.50, and Trojan.

Goondi Mill Area.

Badila, Badila Seedling, Pindar, Q.44, Ragnar, Trojan, and Vidar.

South Johnstone Mill Area.

Badila, Badila Seedling, Clark's Seedling, Eros, Pindar, Q.44, Q.50, S.J.4., Trojan, and Vidar.

Mourilyan Mill Area.

Badila, Badila Seedling, Clark's Seedling, Eros, Pindar, Q.44, Q.50, S.J.4., Trojan, and Vidar.

Tully Mill Area.

Badila, Badila Seedling, Clark's Seedling, Eros, Pindar, Q.44, Q.50, and Trojan.

Victoria Mill Area.

Badila, Eros, Pindar, Ragnar, and Trojan.

Macknade Mill Area.

Badila, Eros, Pindar, Ragnar, and Trojan.

Invicta Mill Area.

North of Townsville.

Badila, Eros, Pindar, Q.50, Ragnar and Trojan.

South of Townsville.

Badila, Clark's Seedling, Comus, E.K.28, Pindar, Q.50, Q.57, S.J.16, and Trojan.

Inkerman District.

Badila, B.208, Clark's Seedling, Comus, E.K.28, Pindar, P.O.J.2878, S.J.2, S.J.16, and Trojan.

Pioneer Mill Area.

Badila, B.208, Clark's Seedling, Comus, E.K.28, Pindar, Q.57, S.J.2, S.J.16, and Trojan.

Kalamia Mill Area.

Badila, B.208, Clark's Seedling, Comus, E.K.28, Pindar, P.O.J.2878, Q.57, S.J.2, S.J.16, and Trojan.

Inkerman Mill Area.

Badila, B.208, Clark's Seedling, Comus, E.K.28, Pindar, P.O.J.2878, Q.57, S.J.2, S.J.16, and Trojan.

Proserpine Mill Area.

Badila, C.P.29/116, Comus, E.K.28, M.1900 Seedling, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, and Trojan.

Cattle Creek Mill Area.

Badila, Badila Seedling, Co.290, Comus, E.K.28, M.1900 Seedling, Pindar, P.O.J.2725, P.O.J.2878, Q.28, Q.45, Q.50, and Trojan.

Racecourse Mill Area.

Badila, Badila Seedling, Comus, M.1900 Seedling, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, and Trojan.

Farleigh Mill Area.

Badila, Badila Seedling, Co.290, Comus, E.K.28, M.1900 Seedling, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, S.J.2, and Trojan.

North Eton Mill Area.

Badila, Badila Seedling, Clark's Seedling, Comus, E.K.28, M.1900 Seedling, Pindar, P.O.J.2725, P.O.J. 2878, Q.28, Q.45, Q.50, S.J.2, and Trojan.

Marian Mill Area.

Badila, Badila Seedling, Comus, E.K.28, M.1900 Seedling, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, and Trojan.

Pleystowe Mill Area.

Badila, Badila Seedling, Clark's Seedling, Co.290, Comus, E.K.28, M.1900 Seedling, Pindar, P.O.J.2725, P.O.J.2878, Q.28, Q.45, Q.50, S.J.2, and Trojan.

Plane Creek Mill Area.

Badila Seedling, Co.290, Comus, E.K.28, M.1900 Seedling, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, and Trojan.

Qunaba Mill Area.

C.P.29/116, Co.290, Pindar, P.O.J. 2878, Q.47, Q.49, Q.50, and Q.55.

Millaquin Mill Area.

C.P. 29/116, Co.290, Pindar, P.O.J. 2878, Q.47, Q.49, Q.50, and Q.55.

Bingera Mill Area.

Atlas, C.P.29/116, Co.290, Pindar, P.O.J.2878, Q.25, Q.47, Q.49, Q.50, Q.55, and Vesta.

Fairymead Mill Area.

C.P.29/116, Co.290, Pindar, P.O.J. 2878, Q.47, Q.49, Q.50, and Q.55.

Gin Gin Mill Area.

C.P.29/116, Co.290, Co.301, M.1900 Seedling, Pindar, P.O.J.2878, Q.25, Q.47, Q.49, Q.50, Q.55, and Vesta.

Isis Mill Area.

C.P.29/116, Co.290, Co.301, Pindar, P.O.J.2878, Q.42, Q.47, Q.49, Q.50, Q.51, and Q.55.

Maryborough Mill Area.

Pialba District.

C.P.29/116, Co.290, Co.301, P.O.J. 213, P.O.J.2878, Q.42, Q.47, Q.49, Q.50, and Q.51.

Maryborough District.

C.P.29/116, Co.290, Co.301, M.1900 Seedling, P.O.J.213, P.O.J.2878, Q.42, Q.47, Q.49, Q.50, and Q.51.

Mount Bauple District.

C.P.29/116, Co.290, M.1900 Seedling, P.O.J.213, P.O.J.2878, Q.42, Q.47, Q.49, Q.50, and Q.51.

Moreton Mill Area.

C.P.29/116, Pindar, Q.28, Q.42, Q.47, Q.50, and Vesta.

Rocky Point Mill Area.

C.P.29/116, Co.290, N.Co.310, P.O.J. 2878, Q.28, Q.47, Q.49, Q.50, Q.813, Trojan, and Vesta.

NORMAN J. KING,
Director of Sugar Experiment Stations.

Approved Fodder Canes

Bureau of Sugar Experiment Stations, Brisbane, 1st January, 1954.

All farmers are advised that the following are the varieties of cane which may be grown for fodder purposes in the sugar mill areas as set out below:—

Mossman, Hambledon, Mulgrave, Babinda, Goondi, South Johnstone, Mourilyan, Tully, Victoria, Macknade, Invicta, Pioneer, Kalamia, and Inkerman Mill Areas:

China, Uba, Co.290, "Improved Fodder Cane," and Co.301.

Proserpine, Cattle Creek, Racecourse, Farleigh, North Eton, Marian, Pleystowe, and Plane Creek Mill Areas:

China, Uba, "Improved Fodder Cane," and Co.301.

Qunaba, Millaquin, Bingera, Fairymead, Gin Gin, Isis, Maryborough, Moreton and Rocky Point Mill Areas:

China, 90 Stalk, "Improved Fodder Cane," C.S.R.1 (also known as E.G.), and Co.301.

NORMAN J. KING,

Director of Sugar Experiment Stations.

Effect of Mercurial Spraying on Cane

Following the widespread outbreak of pineapple disease in 1951, many growers dipped their plants in mercurial solutions and obtained excellent strikes. But, unless he was prepared to spend a large sum to provide an efficient dipping plant, the average grower found that dipping was too slow and laborious if large acreages were to be planted. Consequently several types of spraying machines were put on the market, the principal ones used in the Mackay area being the Nuttall, the Milne, and the Hodge. The high standard of efficiency reached by these machines is demonstrated by the following example.

Fig. 51—Showing poor germination in two rows where spraying device had broken down.

On the farm of Jarrott Bros., Branscombe, the growers used a Nuttall spray during their planting and obtained a very good strike. However, portion of two rows was unsprayed because of a mechanical breakdown of the pump. These rows were behind the sprayed rows for vigour and germination. As can be seen in the accompanying photograph, there were large gaps in the untreated rows and upon examination these plants were found to be infected with pineapple disease.

Most growers are using sprays in preference to the dipping method. As they are satisfied with the results, the growers intend to use this method as a farm practice to ensure a quick, even germination.—A. A. M.

A Problem in Cross-Pollination

By J. H. BUZACOTT

The first step in the production of new sugar cane varieties is the fertilization of the flowers of one variety of sugar cane with pollen taken from another variety. This is the process known as cross-pollination. One of the many difficulties which the cane breeder has to face is the fact that not all varieties of cane flower at the same time. Since the practice has developed of crossing thin, so-called "wild" varieties of cane with the thicker sweet types known as noble canes this different period of flowering has become an increasingly serious problem; for instance, in North Queensland few of the noble canes commence flowering before the end of May, whilst some of the wild canes have completed their flowering period by the end of January.

Methods for overcoming these difficulties and enabling crosses to be made between even the most extreme of these types have developed in three directions; firstly, delaying the arrowing of early-flowering canes; secondly, inducing earlier arrowing in the late flowering ones; and, thirdly, the transfer of pollen by aeroplane from cane flowering in one latitude to the variety with which it is desired to make a cross and which may be flowering at the same time in a different part of the world.

In order to delay the flowering of the early flowering varieties it has been customary for many years at Meringa to cut back the leaves of the stalks which it is desired to delay. This work is carried out usually in December, January or February, depending on the variety, and some varieties have to be lopped more than once. With cane lopped in this way a delay in arrowing of from two to three weeks is possible. Another successful method of delaying arrowing which has been developed in recent years consists of subjecting the cane for several nights to a short period of light during the hours of darkness. Cane arrows commence to form at the growing point of normal stalks some two months before the arrows actually

Fig. 52—Field of parent canes at Meringa illuminated to delay arrowing.

emerge and it is necessary to subject the plants to this period of broken darkness prior to the commencement of arrow formation. By switching on lights for a short period each night and ceasing this practice at about two months before it is desired that the cane should arrow it is possible to have effective but delayed arrowing with many of the early flowering varieties.

In 1951 a lighting system was installed on one field at Meringa Experiment Station and in this field are planted certain varieties of which it is desired to delay the arrowing. Only a small portion of the field is lit and for this purpose two 300 candle-power electric bulbs are used. When in operation the lights are switched on for twenty minutes each night at midnight, the switching on and off being automatically controlled by means of a time switch. The accompanying picture shows the field in which the lighting is installed. The box on the post in the foreground houses the time switch, whilst the lighting bulbs can be seen on posts, one on the extreme left of the picture and the other in the background just to the right of the main pole.

A method of inducing earlier flowering is the enclosure of the varieties in light-tight boxes or buildings during the evening before darkness falls so as to shorten the period of daylight to which the cane is exposed. If more convenient the cane can be moved into the dark houses after darkness falls and removed at a certain time each morning after daybreak. This method works very well with certain wild varieties, but has not been successful with the noble canes. Unfortunately in Queensland it is mainly the noble varieties in which we desire to induce earlier arrowing and our trials with noble canes in these enclosures have so far been unsuccessful.

Both the above methods of changing the flowering period depend on the fact that the time of flowering of many plants, including sugar cane, is determined by the length of day. In sugar cane the day-length necessary to initiate flowering is constant for any one variety but varies very considerably for different varieties. For instance, some of the *spontaneum* canes require a day-length of nine hours, whilst other varieties require up to fifteen hours of daylight for arrowing to occur. In one extreme case it was found in India that free flowering of the Burma *spontaneum* required a day-length of only two hours.

A further method of overcoming the big difference between the flowering time of some parent canes has been used to some extent in America. This consists in sending pollen of one variety by air from a country where the desired male parent is flowering. It is possible to do this because variety collections exist on breeding stations in many different latitudes, and since day-length varies with latitude it is often possible in this way to synchronise the flowering of varieties which when both grown at the same latitude, flower many months apart. By the use of this method American sugar cane breeders were successful some years ago in fertilizing commercial types of cane growing almost on the equator in Colombia, South America, with pollen from the wild Burma *spontaneum* which was growing in Puerto Rico. This *spontaneum* flowers rarely and early and has such a short flowering period that under normal circumstances it is difficult to cross with it.

New methods of bringing about difficult crosses are continually being developed and are eagerly seized on by plant breeders as further weapons in the continual fight for higher yielding disease-resistant varieties.